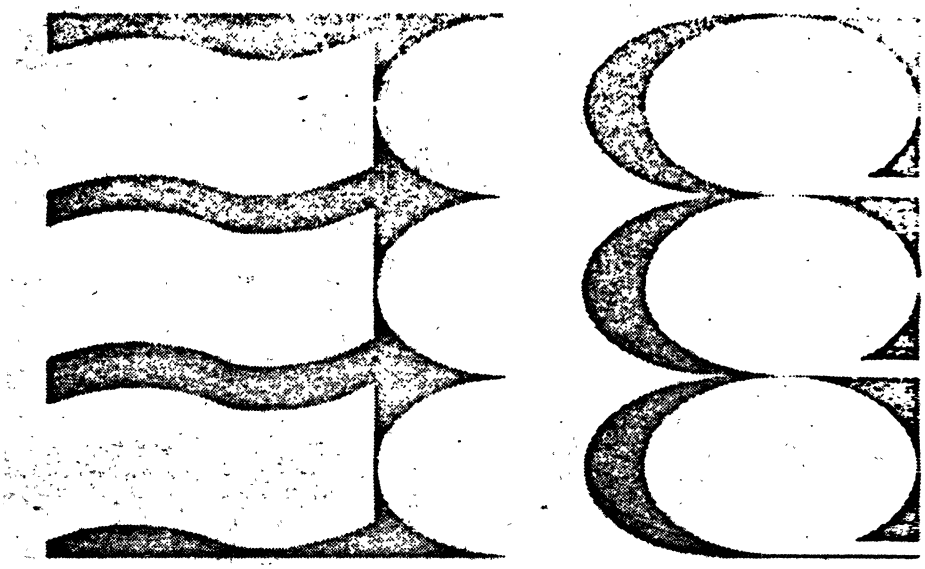


UNIVAC ENGINEERING PROGRAMMING LIBRARY

ENGINEERING PROGRAMMING SECTION - DATA PROCESSING DIVISION, ROSEVILLE, MINNESOTA

9400 0853 VI-C MAGNETIC TAPE SUBSYSTEM
TIMING AND GRAPHING TEST PROGRAM
DESCRIPTION DRAWING

4091644

DRAWING NUMBER 4091644

REVISION C

UNIVAC

ENGINEERING PROGRAMMING LIBRARY

9400 0353 VI-C MAGNETIC TAPE SUBSYSTEM
TIMING AND GRAPHING TEST PROGRAM
DESCRIPTION DRAWING

	SIGNATURE	TITLE	DATE
APPROVAL			
APPROVAL			
APPROVAL			
APPROVAL			

Is there an associated listing? NO

The associated listing revision is: C

REVISION STATISTICS RECORD 4091644

DWG REV	MSTR REV	RELEASE DATE	DESIGNER NAME	EIR NUMBER	FCO NUMBER
-	A	2/14/69	T. M. Katanik	A89791	A30190009
A	B	4/4/69	R. R. Graham	A89792	A30190017
B	C	5/28/69	R. R. Graham	A89793	A30190020
C	E	8/25/69	L. L. Bingen	A89795	A30190024

REVISION DESCRIPTION RECORD 4091644

REV	DESCRIPTION
-	Special Release
A	Document changes only. Section 3.0 was corrected to include previously omitted information on adding parameters.
B	Added a "F1" parameter to eliminate a mode set problem associated with controllers without 7-Track hardware (per request; RFC 131517). Also, changed to conform to new device numbering scheme and changed the program load name from "TTØ858" to "TØ858T".
C	1108 to 9400 Assembler-Conversion. Modify to allow pre-parameterization, test now prints graph of Test 3 via PMR and corrected stop on error option so that test stops before attempting error recovery.

TABLE OF CONTENTS

Section		Page
1.0	INTRODUCTION	6
1.1	Purpose	6
1.2	Major Objectives	6
1.3	Equipment Configuration	6
1.4	Associated Software	6
1.5	Reference Documents	6
1.6	Restrictions	7
2.0	FUNCTIONAL DESCRIPTION	8
2.1	General Organization	8
2.2	Test Descriptions	8
2.2.1	Test 1 (Group Test)	8
2.2.2	Test 2 (Timing Test)	8
2.2.3	Test 3 (Graphing Test)	10
3.0	OPERATING PROCEDURES	11
3.1	Initialization	11
3.2	Program Loading	11
3.3	Program Starting	11
3.4	Program Modifying	11
3.4.1	Parameter Entries	12
3.4.2	Parameter Notes and Restrictions	12
3.5	Program Stopping	14
3.6	Program Restarting	14
3.7	Program Termination	14
3.8	Program Designators	15
3.8.1	Action Designators	15
3.8.2	Equipment Designators	15
3.8.3	Test Designators	15
3.9	Message Descriptions	16
3.9.1	General	16
3.9.2	General Format Information	16
3.9.2.1	Mnemonics	16
3.9.2.2	Symbols	16
3.9.3	Messages	16
3.9.3.1	Parameter Errors	16

TABLE OF CONTENTS (Continued)

Section		Page
	3.9.3.2 Subsystem Errors	17
	3.9.3.3 Information Messages	21
4.0	SUPPLEMENTARY DATA	23
4.1	Supplementary Descriptions	23
	4.1.1 Servicing Information - Timing Tests	23
	4.1.2 Servicing Information - Read Stop Curves	23
4.2	Illustrations	25
	Figure 1 Generalized Read Stop Curves	26
	Figure 2 Adjustment Characteristics	27
	Figure 3 Read Stop Curve Parameters	28
	Figure 4 Control/Handler 7-Track	29
	Figure 5 Control/Handler 9-Track	30
	Figure 6 Status/Sense/Monitor Sense Bytes	31
	Figure 7 Uniservo VI-C Test Block Diagram	32
	Table 1 Test Availability Table	33
	Table 2 Servo Availability Table	33
	Table 3 Register Allocation	33

1 INTRODUCTION

1.1 Purpose - This document describes the 9400 Maintenance Timing and Graphing Test Program for the UNISERVO VI-C Magnetic Tape Subsystem.

1.2 Major Objectives - The objective of this test program is to perform a timing measurement of the UNISERVO VI-C Magnetic Tape Subsystem. Test organization and operator options are intended to satisfy the needs of Design, Quality Control and Field Engineering personnel in checkout, acceptance, and maintenance activities.

1.3 Equipment Configurations - All equipment configurations must be connected to the Multiplexer (MPX) I/O Channel of the 9400 Processor. This test will operate the following equipment configuration:

- VI-C Control/Handler 7-Track Type 0858-20,21 (Figure 4).
- VI-C Control/Handler 9-Track Type 0858-18,19 (Figure 5).
- 7-Track NRZI Feature F0828-00
- Data Conversion Feature F0827-00
- 9-Track VI-C Master Unit (1 or 2) Type 0858-10, 11
- 9-Track VI-C Slave Unit (1-6) Type 0858-14, 15
- 7-Track VI-C Master Unit (1 or 2) Type 0858-00, 02
- 7-Track VI-C Slave Unit (1-6) Type 0858-01, 03

1.4 Associated Software - This program relies on the Maintenance Control Routine (MCR) to perform program load, parameterization, execution, deletion and I/O handling.

1.5 Reference Documents - Documents used as reference material during the development of this test program are as follows:

Drawing	Revision	Description
S-70040		NCF-H Processor and Console Product Description
P-12151		NCF-H System Product Description
4091622		9400 Maintenance Control Routine Program Description Drawing
	-	9400 Bootstrap Assembler on 1107/1108
4096482	C	Documentation Standard for Engineering Programming Publications
4096483		General Parameter and Message Standard for Test Programs
4096484		9400 Maintenance Systems Guidelines Document
4091623		9400 Parameter and Message Routine Program Description Drawing
4091624		9400 Standards Subroutines
P-10052	A	VI-C Subsystem (9000 Series), Type No. 0858-XX

1.5 Reference Documents (Continued) -

Drawing	Revision	Description
SH03609	A	VI-C Subsystem (9000 Series) Test Programs
	-	Engineering Recommendation of Test Program for the VI-C Subsystem (9000 Series)
SH02780		Engineering Specifications for the UNISERVO VI-C
4091643	3	9400 VI-C Magnetic Tape Test Program Description Drawing

1.6 Restrictions - Since the VI-C Graphing Test must use the high speed printer for its output media, any concurrently running printer tests must be suspended before the graphing test is made available to this program.

These tests do not check the ability of the VI-C's to read and write data accurately or to execute commands correctly. They are designed only to measure the mechanical characteristics of the VI-C's. Therefore, it is suggested that the control unit test of MTØ858 (Drawing No. 4091643) be run prior to the tests described in this document.

The timer must be enabled from the Maintenance Panel for all tests.

The address of the high speed printer is obtained from MCR rather than through parameter entries.

2 FUNCTIONAL DESCRIPTION -

2.1 General Organization - This MAR uses three operator-selectable tests to measure the timing characteristics of a UNISERVO VI-C Magnetic Tape Subsystem. The program cycles these tests under various conditions which are selectable by the operator via parameter entries. If an error is detected, an error printout is automatically generated unless Option V1 has been deleted from the test program. The Read-Stop time curve will be displayed on the Model Ø768 Printer.

As soon as the initial parameters have been selected, the control section is entered and immediately checks for a test in progress. If a test is running, the control section will select the next subroutine, provided that the assigned device is still available. After a device has been completely tested (all the subroutines have been applied), it is flagged as done and the program is recycled to check its tables for another available device.

After all devices have been run by the initial test, that test is flagged as finished, the indicated devices are reactivated, and the program is recycled. When all the selected tests are flagged as finished, the MAR is repeated or suspended, depending on whether or not the Cycle Option (V14) has been entered.

All tests are capable of running on a 7-Track device. A Standard Mode Set Command which sets a condition of 800 BPI, odd parity, and Data Converter "off" is issued prior to each test. This command will be ignored by 9-Track devices.

2.2 Test Descriptions - Each of the following tests is described by stating its objective and the method used to attain it.

2.2.1 Test 1 (Group Test) -

Objective - The objective of Test 1 is to enable both Test 2 and Test 3 to be internally selected simply by entering Test 1.

Method - The program parameter routine will internally select and make available Test 2 and Test 3 when it encounters Test 1.

2.2.2 Test 2 (Timing Test) -

Objective - This test is designed to measure the Forward Stop Distance, the Forward and Backward Start times, and the Forward Creep Distance. The test also measures the interblock gap distances created as a result of running in both Start-Stop and Non-Stop Modes.

Method - The test uses the Timing Mode of operation which will allow it to measure all times by adding the execution times of a series of loop instructions. The test enters the "loop" at the start of an I/O operation and exits from the loop when the BCW is decremented once.

The following method is used to measure the Forward Stop Distance:

1 - Write one long block of data.

2 - Backspace.

3 - Write a short block of data, overwriting part of the long block.

4 - Backspace.

5 - Read short block.

6 - After interrupt from short block issue a Read Command for the remainder of the long block and enter "loop".

7 - Exit from "loop" when BCW is decremented and obtain time.

8 - Multiply this time by tape speed, result being Forward Stop Distance in inches.

The tape is then rewound and the Forward Start-Stop gap distance is measured in the following manner:

1 - Write two blocks of data in Start-Stop Mode.

2 - Backspace twice.

3 - Read one block.

4 - After interrupt, immediately issue another Read Command and enter timing loop.

5 - Exit loop when BCW is decremented and obtain time.

6 - Multiply time by tape speed to obtain gap distance in inches.

The test then measures the Backward Start Time by the following method:

1 - Write two blocks of data in Non-Stop Mode.

2 - Read Backward one block and wait for tape motion to stop.

3 - Issue Read Backward Command and enter timing loop.

4 - Exit loop when BCW is decremented and obtain time, which is the Backward Start time in milliseconds.

The test proceeds to measure the non-stop gap backwards using the following method:

1 - Space forward two blocks.

2 - Issue Read Backward Command and read in one block of data.

3 - After interrupt, immediately issue another Read Backward Command and enter timing loop.

4 - Exit loop when BCW is decremented and obtain time.

5 - Multiply time by tape speed to obtain gap distance in inches.

The MAR then measures the same non-stop gap in the forward direction by the following method:

1 - Issue Read Command and read in one block of data.

2 - After interrupt, immediately issue another Read Command and enter timing loop.

3 -- Exit loop when BCW is decremented and obtain time.

4 -- Multiply time by tape speed to obtain gap distance in inches. This distance will be saved for future reference.

The Forward Start Time in the previously written non-stop gap is measured by the following method:

1 - Backspace two blocks.

2 - Read one block of data and wait for tape motion to stop.

3 - Issue Read Command and enter timing loop.

4 - Exit loop when BCW is decremented and obtain time, which is the Forward Start Time in milliseconds.

The last measurement made in this test is the forward creep distance. The MAR uses the following procedure:

1 - Backspace and write over the second non-stop written block ten times.

2 - Backspace two blocks.

3 - Measure gap by same method as used on the forward non-stop gap.

4 - Subtract previously saved non-stop gap distance. Difference is ten times the creep distance.

5 - Divide result by ten, giving the forward creep distance in inches/ overwrite.

2.2.3 Test 3 (Graphing) -

Objective - This test is designed to measure the Forward and Backward Read start time and print out a graphical presentation of the result on the high speed printer.

Method - The Timing Mode of operation is used in a fashion similar to Test 2, except that a variable delay loop is entered before the second read. The sequence is as follows:

1 - Write 120 256-byte blocks.

2 - Rewind tape.

3 - Issue Read Command.

4 - When interrupt is generated, a delay routine is entered. The delay varies from 3.2 to 17.8 milliseconds.

5 - The next Read Command is issued and a counter measures the time from the issuance of the command until the first character comes into memory.

6 - The delay steadily increases while 120 consecutive measurements are made.

7 - The result is the Forward Read-Stop curve done once. The Backward Read-Stop curve is done the same way except the Read Backward Command is issued instead of Read Forward and the delay starts at maximum and decreases to minimum.

3. OPERATING PROCEDURES

3.1 Initialization - Pre-test setup consists of the following:

- Load the Maintenance Control Routine (MCR).
- Mount blank tapes on all the UNISERVO VI-C Tape Units to be tested (maximum of eight units).

3.2 Program Loading - The procedure for program loading is as follows:

- Press the ATTENTION key. The console responds with the @ sign, the time stamp, a space and then waits for an input message.
- Type in "RU". The console responds by printing an "N" adjacent to the "RU" followed by a space.
- Type in program name as follows:

  TØ858T

- Press the EOM key (symbol ⊕). The load and run statement which initiates loading and running the program appears on the console in the following format:

  @ 00:00 RUN TØ858T⊕

- When the program has been loaded, the MCR prints a message which indicates the program's job number and the starting address of the test program.

  JOB 1, TØ858T LOADED AT Ø299Ø

3.3 Program Starting - The program is started by the MCR as soon as it is loaded. When the program is started, it types out the message:

*A ØØ:16 1 TØ858T ENTER PARAMETERS

and waits for a parameter entry. Parameters are entered in the format described in Paragraph 3.4.1 using the procedure described in Paragraph 3.4.

3.4 Program Modifying - The program is adjusted to operate a specific configuration in various operating modes by entering unsolicited parameters.

The parameter entry procedure is as follows:

- Press the ATTENTION key. The console responds with an @ sign and a time stamp (@ 02:27) and waits for a run identifier entry.
- Type in the one-digit job or run number and a comma. A job number entry must be made within two minutes after the ATTENTION key was pressed or an abort typeout will occur. An example of an entry statement to this point is shown below:

  @02:27 1,

- Enter up to 63 characters of a parameter data ending the statement by pressing the EOM key. An operator must enter all data following the comma within two minutes or an abort message will be printed. A completed entry statement is shown below.

  ● ØØ:13 1,A T2◉

- Enter the needed parameters, then begin the program by entering a Begin Action Designator. The Begin Designator may be entered in two ways: in a separate statement, or as a separate sentence in a parameter entry statement. An example of each is shown below.

  ● ØØ:5Ø 1,B◉

  ● ØØ:5Ø 1,A T2 V3:#NEØ.D V1.B◉

3.4.1 Parameter Entries - Parameters are entered in a statement with the following general format:

d Vn Tn:#Ann◉

Where:

d = An Action Designator which instructs the program to add the following parameters to the parameter table.

Vn = Variables (Program Options) to be selected.

Tn = A number or group of numbers indicating which tests are to apply to the subsystem.

\# = Signal to the PMR that a three-digit device address follows.

Ann = A three-character device address consisting of, in order, an alpha character (arbitrarily assigned) which designates the subsystem's control unit, a hexadecimal number (1-F) which specifies the subchannel address of the controller, and a hexadecimal number (Ø-F) which specifies the selected device in the subsystem.

◉ = End-of-Message symbol.

3.4.2 Parameter Notes and Restrictions -

1. Variable One (V1) applies to equipment error messages only. It does not apply to parameter errors or program status messages.
2. A period(.) is used to separate parameter sentences.

   Example: A T2.D T7◉

3. The colon(:) must be used to separate devices from the rest of the parameter statement.
4. The Action Designators E(Suspend) and R(Resume) may be applied to specific devices and/or tests.

   Example: E T2:#NEØ◉ (Suspend Test 2 and device Ø)

   R T2,3:#NE2-4◉ (Resume Tests 2-3 and devices 2-4)

   E T3,R:#NE7◉ (Suspend Test 3 and resume device 7)

5. To replace a subchannel, delete the unwanted subchannel AND ITS ASSOCIATED DEVICES, and then enter the new subchannel and devices.

   Example: D:#GEØ-7,A:#GAØ-7↵

   Device selection is altered by simple deletion and entry procedures.

   Example: D:#GB5↵ A:#GBF↵

6. The test program will not recognize any extension on the Action Designators B(Begin) and V(View).

7. The Action Designator D↵ resets the program variables to the values they contained at load time: Allow Error Printout, Allow Error Recovery Three Times, Do Not Stop On Error, and Send All Error Messages to the Console.

8. The Action Designator B↵ (Begin) must be used to get the program initially started. When used to restart the test program, it will reset all selected devices and tests to an available state.

9. To determine the present test parameters, enter the Action Designator V↵ (View). This entry will display on the console the parameters present in the test program in the general format shown below:

```
Vn,n ... n
T2/yy T3/yy
Ann/yy; Ann/yy
```

Where:

Vn = Present Variables

/yy = Present state of indicated test

- 0 = Not selected
- 10 = Suspended
- 20 = Finished
- 40 = Active
- 80 = Pending

Ann = Present devices (including controller and subchannel)

/yy = Present state of device

- 0 = Not selected
- 20 = Finished
- 80 = Pending
- 10 = Suspended

3.5 Program Stopping - The test program can be stopped by one of the following entries:

- A parameter entry having the following format:

  E⊕

  This entry will cause the test program to suspend without console indication.

- A parameter entry having the following format:

  D⊕

  This entry will clear all test parameters and cause the test program to suspend itself with the following console indication:

  A hh:mm 1 TØ858T NO TESTS SELECTED

  This message will also be displayed when all selected tests have been completed and the Cycle Option (V14) is not entered.

- Encountering an error with the Stop On Error Variable (V4) entered will cause the test program to suspend itself with the following console indication:

  D hh:mm 1 TØ858T STOPPED ON ERROR

3.6 Program Restarting - The test program can be restarted by one of the following entries:

- A parameter entry having the following format:

  B⊕

  This entry will restart the test program from its initial starting point.

- A parameter entry having the following format:

  R⊕

  This entry will restart the test program at the point at which it was stopped. It can be used if the test program has been suspended by the E⊕ type-in or if it has stopped on error (V4 entered).

3.7 Program Termination - The program may be removed from storage by submitting a cancel directive to the Maintenance Control Routine.

The cancel directive is entered as follows:

1. Press the ATTENTION key. The MCR will type the time and wait for another another entry.
2. Type the letters CA. The MCR will respond with the letters NCEL and a Space code. The typeout to this point is:

   Ø9:27 CANCEL

3. Type the job identifier and stop code (⊕).

   A complete example of a cancel entry is:

   Ø9:27 CANCEL 5 ⊕

3.8 Program Designators - The parameter designators recognized by this test program are grouped into three categories:

- Action Designators
- Equipment Designators
- Test Designators

3.8.1 Action Designators - The Action Designators specify how the Parameter Analysis Routine of the test program will process the desired parameters. The following Action Designators are recognized by this test program:

A = Add

B = Begin

D = Delete

E = Suspend

R = Resume

V = View

3.8.2 Equipment Designators - The Equipment Designators define the particular UNISERVO VI-C being tested. The following Equipment Designators are recognized by this test program:

Ann = A three-character device address consisting of, in order, an alpha character (arbitrarily assigned) which designates the subsystem's control unit, a hexadecimal number (1-F) which specifies the subchannel address of the controller, and a hexadecimal number (Ø-F) which specifies the selected device in the subsystem.

3.8.3 Test Designators - Test Designators are parameters which modify the test programs testing procedure. The following Program Designators are recognized by this test program:

Tn = A number or group of numbers indicating what tests are to apply to the subsystem.

Where: T1 = Group Test

T2 = Timing Test

T3 = Graphing Test

Vn = A number or group of numbers (1,3,4,7,or 14) indicating what variables are to apply to the subsystem.

Where: V1 = Allow Error Printouts (available on load).

V3 = Allow Error Recovery 3 Times

V4 = Stop on Error

V7 = Direct Error Messages to High Speed Printer

V14 = Cycle Selected Tests

No extensions of these variables are recognized.

3.9 Message Descriptions -

3.9.1 General - When the VI-C MAR detects an abnormal condition in the hardware status or when insufficient parameters are entered, it informs the operator via a console message. If Variable Seven (V7) was entered and a High Speed Printer is available, the messages will be displayed by the printer. The graph will always appear on the printer. Essential messages will always be directed to the console.

3.9.2 General Format Information - The mnemonics and symbols used in the messages described in 3.9.3 are defined in the following paragraphs.

3.9.2.1 Mnemonics -

CS = Current Status	EA = Expected Address
ES = Expected Status	RA = Received Address
D = Declarative Messages	CC = Current Command
I = Imperative Messages	CD = Condition Code
A = Answer Message	CAW = Channel Address Word
SB = Sense Bytes	SCW = Subchannel Control Word
Sn = Subchannel (n)	BCW = Buffer Control Word
Tn = Test	OPSW = Old Program Status Word
Dn = Device (n)	NSD = No Sense Data

3.9.2.2 Symbols -

hh = hour (00-23)

mm = Minute (00-59)

r = Run Number (1-8)

n or nn = Numerical Value of Mnemonic prefix

yy = Device or Test Status Code

3.9.3 Messages - Any message originating from the test program will be one of three types: a Parameter Error Message, a Subsystem Error Message, or an Information Message. Each type is described below.

3.9.3.1 Parameter Errors - Parameter errors result when insufficient parameters entries are detected by the test program. The following is a list of all Parameter Errors:

1. No Tests Selected -

   Error Message: *A hh:mm 1 T0858T NO TESTS SELECTED

   Cause: No tests are available for testing. If the Cycle Option (V14) is not entered, this message will always appear after completing all selected tests on all selected devices once.

Program Action: Program will wait for more parameters.

Operator Action: Enter valid test, making sure program has a device available. If Cycle Option (V14) is not entered, and no tests or devices were suspended or deleted, the program can be restarted by entering only BØ.

2. No Devices Selected -

Error Message: *A hh:mm 1 TØ858T NO DEVICES SELECTED

Cause: Program has no devices selected.

Program Action: Program will wait for more parameters.

Operator Action: Enter parameters making certain to make a device available.

3. No Subchannel Entered -

Error Message: D hh:mm 1 TØ858T NO SUBCHANNEL ENTERED

Cause: Program does not have valid subchannel.

Program Action: Wait for parameters.

Operator Action: Enter parameters specifying a subchannel only.

3.9.3.2 Subsystem Errors - Subsystem errors occur if the status byte, device address, or the sense bytes do not match the expected bytes. Subsystem errors will also occur if an incorrect condition code is received after a Start I/O Command.

1. Status Error

Error Message: D hh:mm 1 TØ858T T2:N42 STATUS ERROR
ES = ØC CS = ØE
EA = ØØC2 RA = ØØC2
CD = ØØ CC = Ø1
SB = Ø84ØØ3AØØØ

Cause: Status received did not match status expected.

Program Action: Program will attempt to recover from error by repositioning the tape and re-issuing the command.

Operator Action: None.

2. Subsystem Not Available -

Error Message: D hh:mm 1 TØ858T T2:N42 SUBSYSTEM NOT AVAILABLE (NSD)
ES = ØC CS = ØØ
EA = ØØC2 RA = ØØC2
CD = Ø3 CC = B3
SB = ØØØØØØØØØØ

Cause: A Start I/O Condition Code of 3 was received on an MCR-initiated command.

Program Action: Suspends the device.

Operator Action: Determine cause of trouble and resume device.

3. Bad Sense Data -

Error Message: D hh:mm 1 TØ858T T2:N42 BAD SENSE DATA
ES = ØC CS = Ø2
EA = ØØC2 RA = ØØC2
CD = ØØ CC = Ø1
SB = ØØØØØØØØØØØØ

Cause: Non-expected status received from a Sense Command.

Program Action: Try standard recovery procedure.

Operator Action: None.

4. Sense Command Failed -

Error Message: D hh:mm 1 TØ858T T2:N42 SENSE COMMAND FAILED (NSD)
ES = ØC CS = ØE
EA = ØØC2 RA = ØØC2
CD = Ø1 CC = Ø1
SB = ØØØØØØØØØØØØ

Cause: Non-zero Condition Code received after a sense operation.

Program Action: Try standard recovery procedure.

Operator Action: None.

5. Reposition Error -

Error Message: D hh:mm 1 TØ858T T2:N42 REPOSITION ERROR
ES = ØC CS = ØE
EA = ØØC2 RA = ØØC2
CD = ØØ CC = 27
SB = Ø84ØØ3AØØØ

Cause: Error condition detected while attempting to recover by repositioning tape.

Program Action: Suspend device.

Operator Action: Resume device when trouble is located.

6. Address Error -

Error Message: D hh:mm 1 TØ858T T2:N42 ADDRESS ERROR
ES = ØC CS = ØC
EA = ØØC2 RA = ØØCØ
CD = ØØ CC = Ø1
SB = Ø84ØØ3ØØØØ

Cause: Interrupt received from different device than expected.

Program Action: Attempt standard recovery procedure.

Operator Action: None.

7. I/O Timeout -

Error Message: D hh:mm 1 TØ858T T2:N42 I/O TIMEOUT
ES = ØC CS = ØØ
EA = ØØC2 RA = ØØØØ
CE = FF CC = Ø1
SB = ØØØØØØØØØØ

Cause: An MCR-initiated I/O command did not get a response from the controller in less than two minutes.

Program Action: Suspend device.

Operator Action: Locate source of trouble and resume device.

8. Status Error - Timing Mode -

Error Message: D hh:mm TØ858T T2:N42 STATUS ERROR - TIMING MODE
CAW = ØØØØØØØ1 SCW = ØE823F5Ø
EA = ØØC2 BCW = ØØØØ3BF8
OPSW = AAØ2ØØC2 8ØØØ3276

Cause: Wrong status received from an MAR-initiated I/O while in Timing Mode.

Program Action: The current test on the device showing an error will be restarted.

Operator Action: None.

9. Timing Mode Timeout -

Error Message: D hh:mm 1 TØ858T T2:N42 TIMING MODE TIMEOUT
CAW = ØØØØØØØ1 SCW = ØE823F5Ø
EA = ØØC2 BCW = ØØØØ3BF8
OPSW = 4AØ2ØØC2 8ØØØ3276

Cause: An MAR-initiated I/O operation did not receive an interrupt from the proper device within four seconds.

Program Action: The current test on the device showing an error will be restarted.

Operator Action: None.

10. Device Halted on Interlock -

Error Message: *A hh:mm 1 TØ858T T2:N42 DEVICE HALTED ON INTERLOCK

Cause: Attempt made to access a device which required manual intervention.

Program Action: Suspend device.

Operator Action: Correct interlock condition and resume device.

11. File Protected -

Error Message: *A hh:mm 1 TØ858T T2:N42 FILE PROTECTED

Cause: Selected device does not have a write enable ring in the tape reel.

Program Action: Suspend device.

Operator Action: Install write enable ring and resume device.

12. Device Non-existent; Deleted -

Error Message: I hh:mm 1 TØ858T T2:N42 DEVICE NON-EXISTENT; DELETED

Cause: Attempt made to access a servo which is not part of the subsystem.

Program Action: Deletes device from device table.

Operator Action: None.

13. Printer Error -

Error Message: D hh:mm 1 TØ858T T3:N42 PRINTER ERROR

Cause: A wrong status condition was detected in the high speed printer during printout of Test 3.

Program Action: Suspend program and wait for parameters.

Operator Action: Correct trouble in printer and resume program (R©).

14. Device Not Available -

Error Message: D hh:mm 1 TØ858T T3:N42 · DEVICE NOT AVAILABLE

Cause: A non-zero Condition Code was received on a program-initiated Start I/O.

Program Action: The current test assigned to the device in error will be restarted.

Operator Action: No operator action is required.

3.9.3.3 Information Messages - Information messages result whenever it becomes necessary for the test program to inform the operator of some contingent outcome. The following is a list of the informative messages:

1. Enter Parameters -

Message:	*A hh:mm 1 TØ858T ENTER PARAMETERS
Cause:	Displayed upon initial entry into the program.
Program Action:	Wait for parameter entry.
Operator Action:	Enter proper parameters.

2. Stopped on Error -

Message:	D hh:mm 1 TØ858T STOPPED ON ERROR
Cause:	Some error condition occurred and V4 was entered.
Program Action:	Suspend further action and wait for parameters.
Operator Action:	To continue, enter Resume Action Designator (RⓈ). To restart, enter Begin Action Designator (BⓈ).

3. Program Re-cycling -

Message:	I hh:mm 1 TØ858T PROGRAM RE-CYCLING
Cause:	All selected tests and devices have been exhausted and the Cycle Variable (V14) has been entered.
Program Action:	Program will re-activate any devices on tests set to a finished state (Code 2Ø).
Operator Action:	None.

4. Device Suspended by Program -

Message:	D hh:mm 1 TØ858T T2:N42 DEVICE SUSPENDED BY PROGRAM
Cause:	An error occurred that was unrecoverable without manual intervention.
Program Action:	Suspends the device indicated in the heading until given a Begin or Resume.
Operator Action:	Correct source of trouble and resume device. Device will automatically be resumed if the program is told to begin again. A suspended device will not resume when the program re-cycles under control of V14.

5. Error Recovery Failure After Three Attempts -

Message:	D hh:mm 1 TØ858T T2:N42 RECOVERY FAILED; 3 ATTEMPTS
Cause:	Program attempted to recover from an error condition three times and failed.
Program Action:	Program will suspend the device and print message four (4) in this section.
Operator Action:	None.

6. Test Restarted - Timing Error -

Message:	I hh:mm 1 TØ858T T2:N42 TEST RESTARTED - TIMING ERROR
Cause:	An error condition that was unrecoverable was detected while in Timing Mode.
Program Action:	The indicated test will be restarted for the device shown in the heading of the message.
Operator Action:	None.

7. Test Failed After Three Error Recovery Attempts -

Message:	I hh:mm 1 TØ858T T2:N42 TEST FAILED; 3 ATTEMPTS
Cause:	The given test was restarted three times in an attempt to run without getting an error while in Timing Mode (most critical phase).
Program Action:	Program will suspend the device and print message four (4) in this section.
Operator Action:	None.

8. Results of Timing Test (Test 2) -

I hh:mm 1 TØ858T T2:N42
FORWARD STOP DISTANCE = ØØ.497 INCHES

I hh:mm 1 TØ858T T2:N42
FORWARD START-STOP GAP = ØØ.7Ø1 INCHES

I hh:mm 1 TØ858T T2:N42
BACKWARD START TIME = 12.7ØØ MILLISECONDS

I hh:mm 1 TØ858T T2:N42
BACKWARD NON-STOP GAP = ØØ.7Ø4 INCHES

I hh:mm 1 TØ858 T2:N42
FORWARD NON-STOP GAP = ØØ.695 INCHES

I hh:mm 1 TØ858T T2:N42
FORWARD START TIME = 12.331 MILLISECONDS

I hh:mm 1 TØ858T T2:N42
FORWARD CREEP DISTANCE = Ø.Ø924 INCH/OVERWRITE

9. Header for Graphing Test (Test 3) -

I hh:mm 1 TØ858T T3:N42
READ-STOP CURVES FORWARD = X BACKWARD = 0 BOTH = *

4 SUPPLEMENTARY DATA

4.1 Supplementary Description -

4.1.1 Servicing Information - Timing Tests - The following chart shows the range of allowable figures for the measurements performed by the Timing Test (Test 2):

MEASUREMENT	7-TRACK Min.	7-TRACK Max.	9-TRACK Min.	9-TRACK Max.
FORWARD STOP DISTANCE - INCHES	.567	.614	.467	.514
FORWARD START-STOP GAP - INCHES	.699	.830	.599	.730
BACKWARD START TIME - MS	12.6	17.2	10.3	14.8
BACKWARD NON-STOP GAP - INCHES	.765	.790	.667	.690
FORWARD NON-STOP GAP - INCHES	.757	.779	.659	.679
FORWARD START TIME	12.6	17.2	10.3	14.8
FORWARD CREEP - INCHES/OVERWRITE	.000	.254	.000	.154

4.1.2 Servicing Information - Read-Stop Curves - The graphs printed by this program can be used as maintenance tools. The Y-axis scale represents the start time measured in milliseconds and the X-axis scale represents the block number. The wave form shown is a representation of tape movmment during Start-Stop action between blocks. By making the mechanical adjustments on the brake stud, puck leaf spring, pressure roller, etc., a definite change is produced on the graph. The delay between the detection of the end of the first block and the issuance of the Read Command for the second block can also be noted on the graph. The exact delay time (t_0) can be calculated by using the formula:

$$t_0 = 3.2 \times .1044n \text{ (milliseconds)}$$

Where n = the block number of the initial block.

Each plotted point on the graph is a measurement of time from the issuance of Read Commands, until the first frame of the next block is seen in memory. The data is written on the tape in non-stop mode to give a common reference but the read-back, when the actual count is taken, is done in start-stop mode. The mechanism's reaction time is obtained by always allowing the brake action to initiate for a certain period of time after reading of a block. This period of time increases for successive blocks. The first block has the start issued immediately after brake

initiation begins, thereby not allowing the mechanism to slow down. As the delay between the brake initiation and start signal increases, the brake has longer to attempt to engage. This action is shown on the graph as a sharply sloping line (Figure 1, Note A). This should continue for 20 plotted points. Because of the increasing delays in the program, true start-stop should occur very close to the 20th block. The indication on the graph that this has occurred is a sharp jump-up (Figure 1, Note B). This should be a clean jump where non-stop mode is left, and start-stop is obtained.

The next characteristic of the curve is a dip (Figure 1, Note C). This represents a resonant frequency of the leaf spring which has the puck attached. It is obtained here as the delay after brake initiation increases. The lowest limit of the dip will occur approximately at the 35th block. The hump following the dip in the graph is the anti-resonant frequency of the leaf spring (Figure 1, Note D), again due to the increasing delay in the program. The peak of this hump will occur approximately at the 55th block.

The final significant point on the graph occurs approximately at the 88th block. (Figure 1, Note E). Here the delay between the stop and start signal has increased to the point of complete start-stop mode. The delay is so great that all interaction is eliminated.

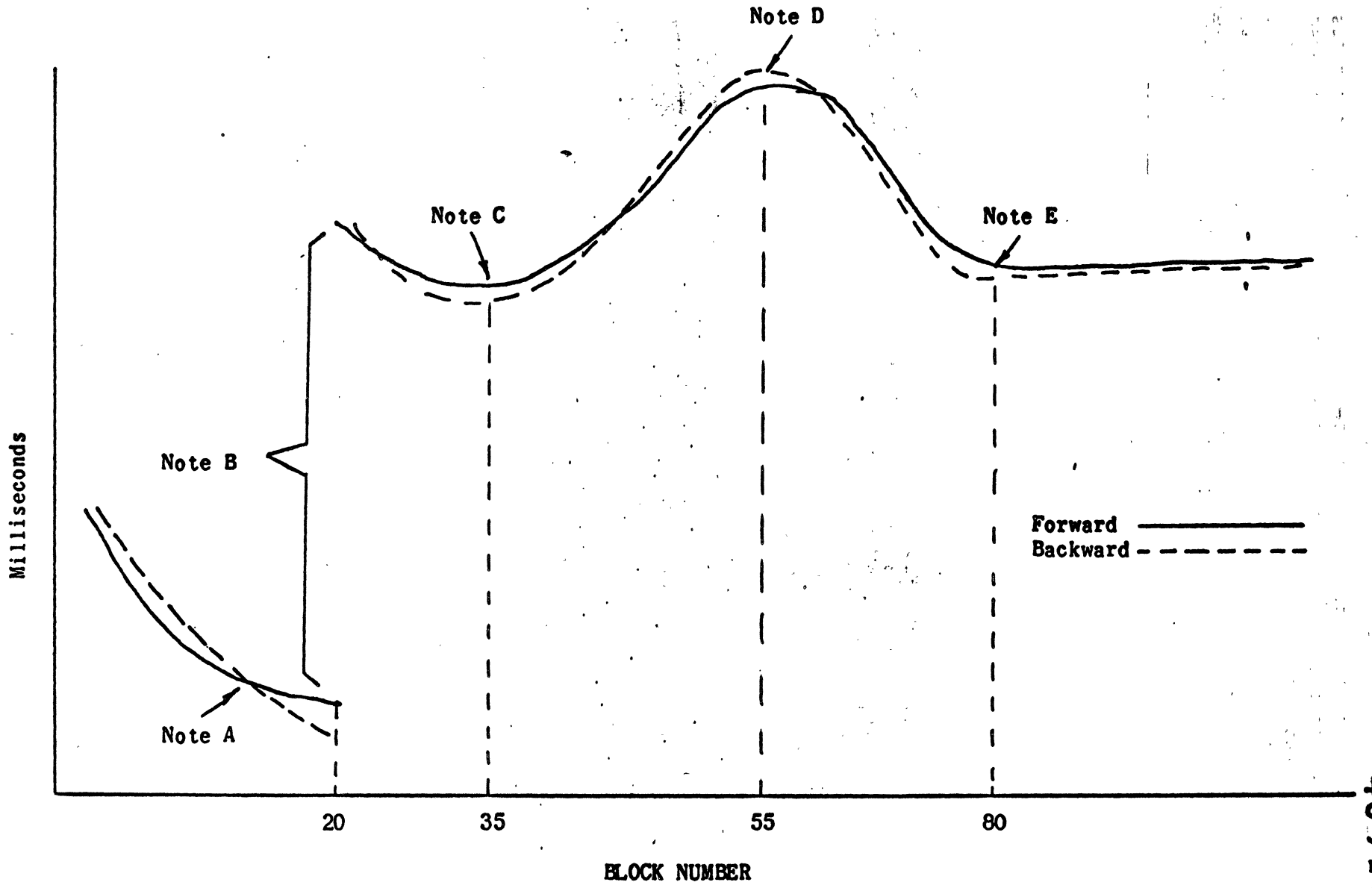
All of the above characteristics hold true for both forward and backward curves. It should be noted that the compatability of the forward and backward tape motion is indicated by the similarity of the two curves; ideally they should overlay each other. The curve characteristics hold for both 7-Track and 9-Track devices, but the difference in interblock gap size (see Figure 3) will cause the whole graph for the 7-Track servo to be higher on the Y-axis than the 9-Track graph.

The adjustments associated with the start-stop time affect the graph in a known manner (see Figure 2). The movement of the brake stud closer to the puck moves the graph toward the left on the "A" adjustment axis. Moving the brake stud away from the puck moves the graph in the opposite direction. The adjustment made to the "leaf spring pre-load screw" affects the position of the graph vertically as shown at Figure 2 "B" adjustment axis. Both these adjustments are very critical. The slightest amount of change makes a big difference in the position of the graph. Therefore, extreme care should be taken when these adjustments are being made. It should also be noted that the adjustment reactions are not exactly vertical or horizontal. This is because the adjustments are interacting. On Figure 2, the adjustment shown as "Adjustment C" is the indication the graph gives when the pressure roller is allowing tape to slip. Note though, that the jump for start-stop mode still occurs very close to Block 20. Even if it occurs much sooner than Block 20 it still indicates that the brake stud is too close to the puck.

The actual tolerances set up in previous adjustment procedures still hold true in adjusting the tape drive. The only difference is the presentation of a graph on a printer instead of an oscilloscope. The criteria for a proper presentation of tape motion is shown in Figure 3. The significant points to adjust to are: point (1) should occur as close to the 20th block as possible, and point (2) should occur between the limits shown. In this case only the portion of the curve which is leveled out should be adjusted to lie in the center of this nominal range. If the two previous adjustments are made to this tolerance, points A and B will

automatically fall into place. Again it is important to note that forward and backward graphs should overlay each other. Any points that do not lie close to the general curve of the graph indicate an inconsistency in mechanical action. If these two adjustments do not bring the graph to proper positioning, the usual procedure for regapping the coil can be followed. A new attempt for fine adjustment should then be made.

4.2 Illustrations -



4091644

Figure 1. Generalized Read-Stop Curves.

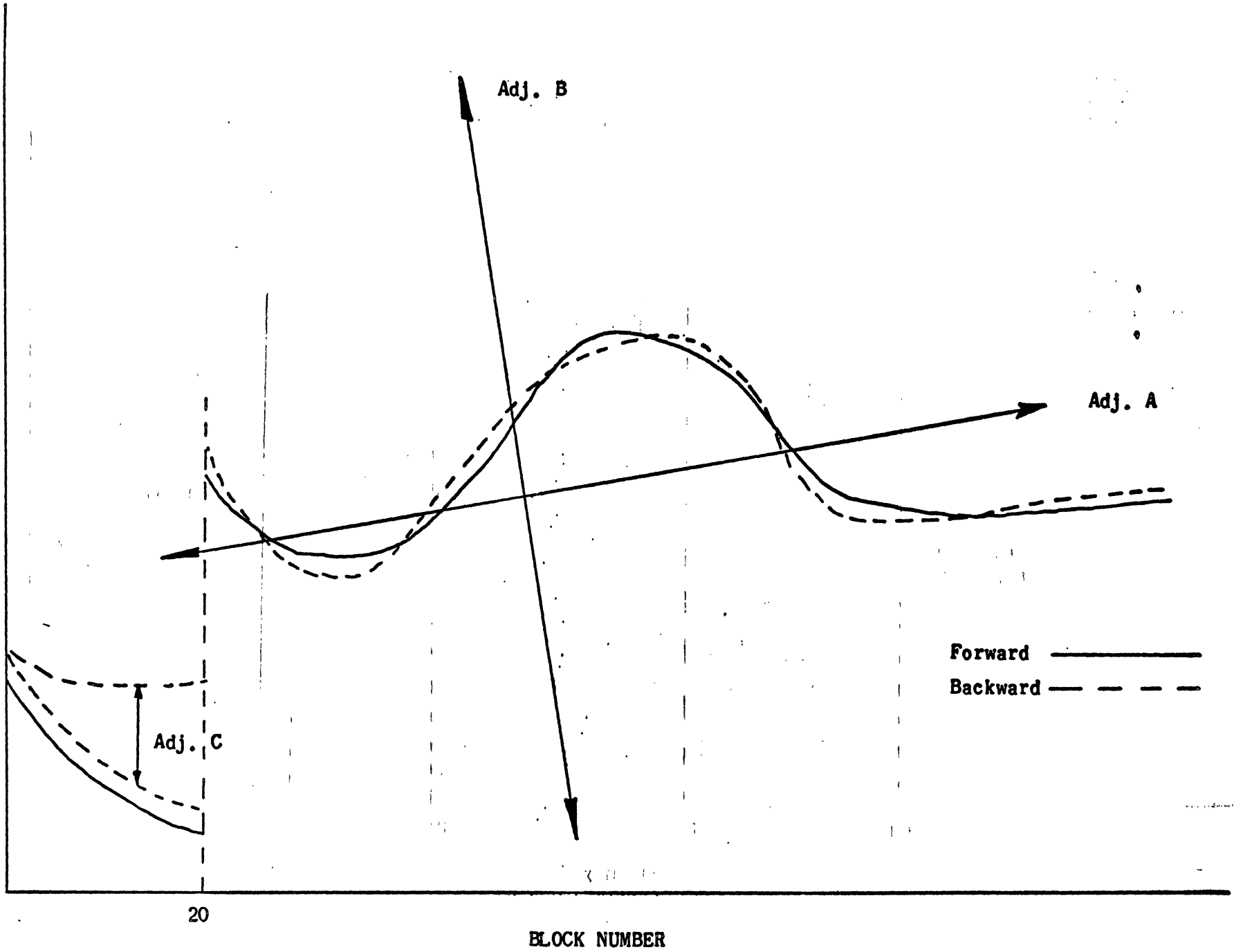


Figure 2. Adjustment Characteristics of Read-Stop Curves.

4091644

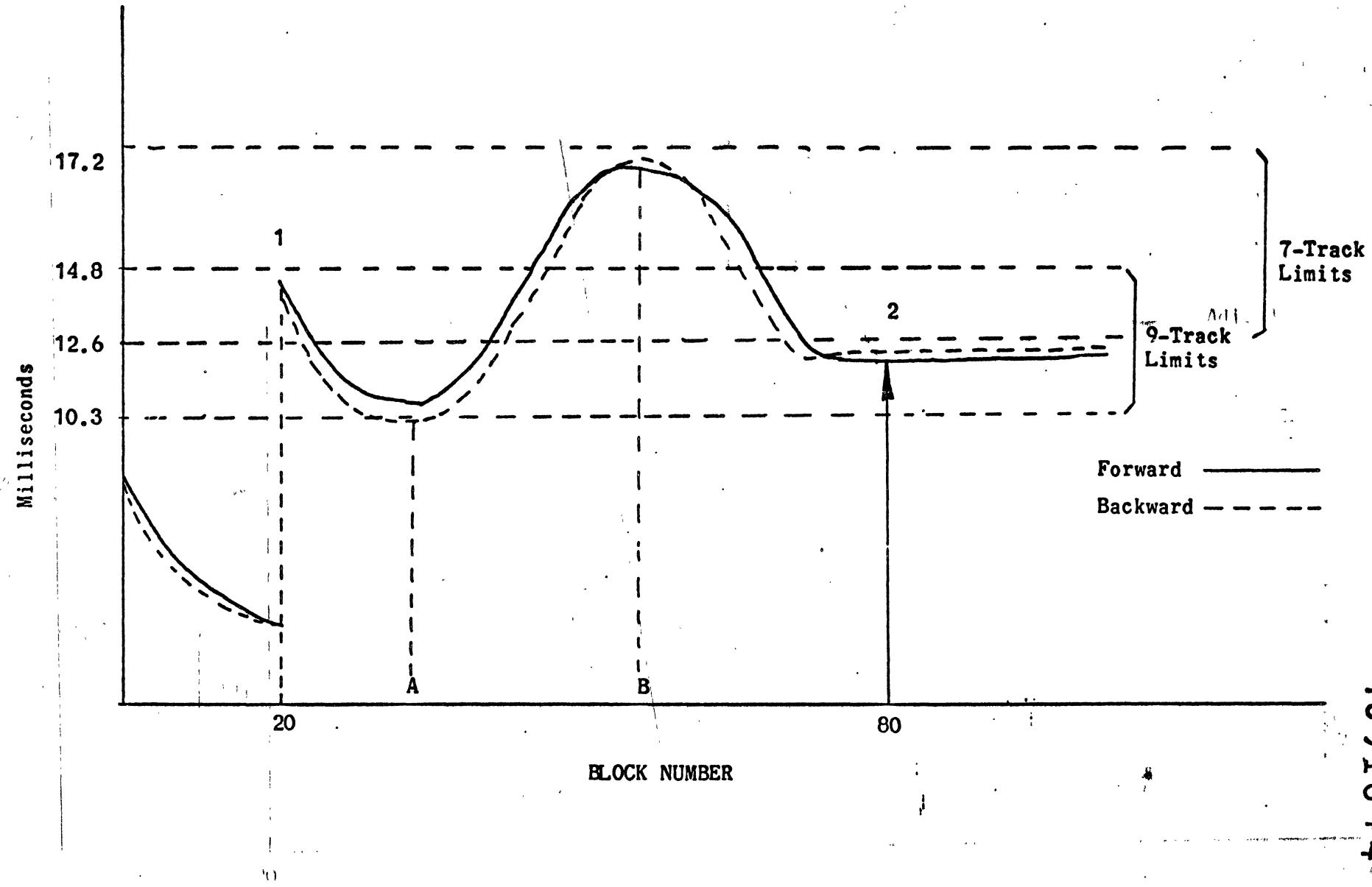
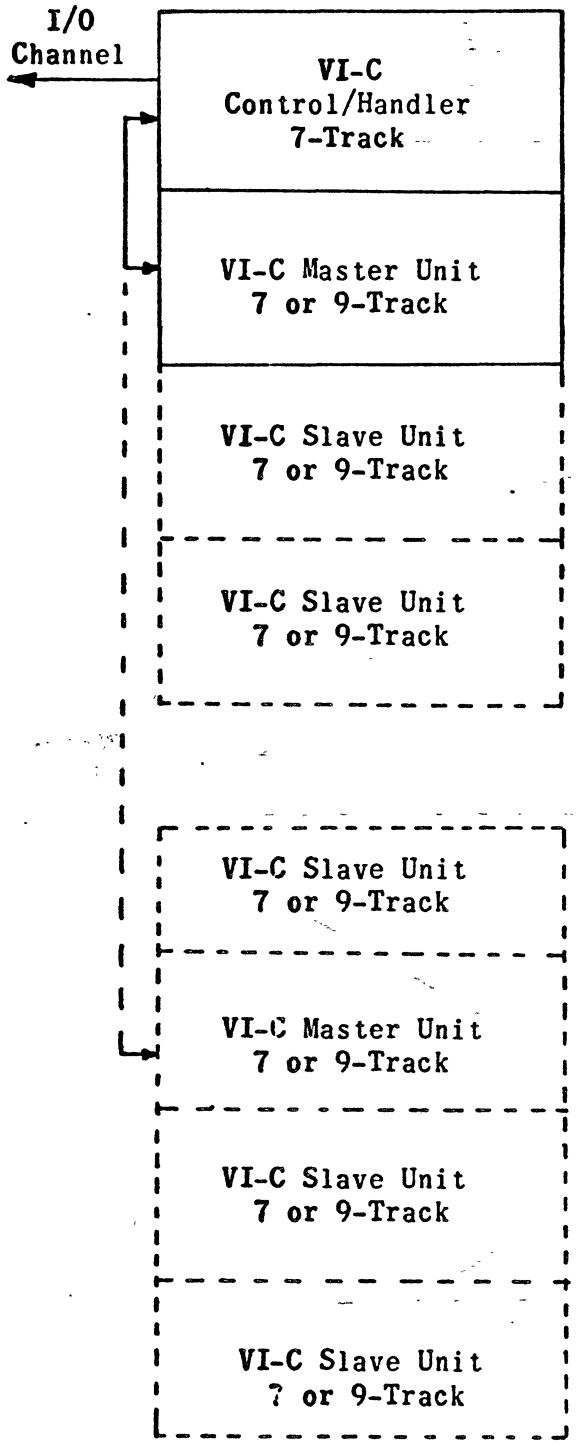


Figure 3. Read-Stop Curve Parameters.

Figure 2. Adjustment Considerations of Read Stop Curves.

4091644



LEGEND: ———— Basic, ----- Expanded

VI-C Control/Handler, 7-Track
Type 0858-20 60-Hz
Type 0858-21 50-Hz

Control:
- 9-Track NRZI, 800 bpi
- 7-Track NRZI-200, 556 or 800 bpi
- One I/O channel
- Up to 8 tape units

Feature:
- Data Conversion (F0827-00)

7-Track VI-C Master Unit
Type 0858-00 60-Hz
Type 0858-02 50-Hz

7-Track VI-C Slave Unit
Type 0858-01 60-Hz
Type 0858-03 50-Hz

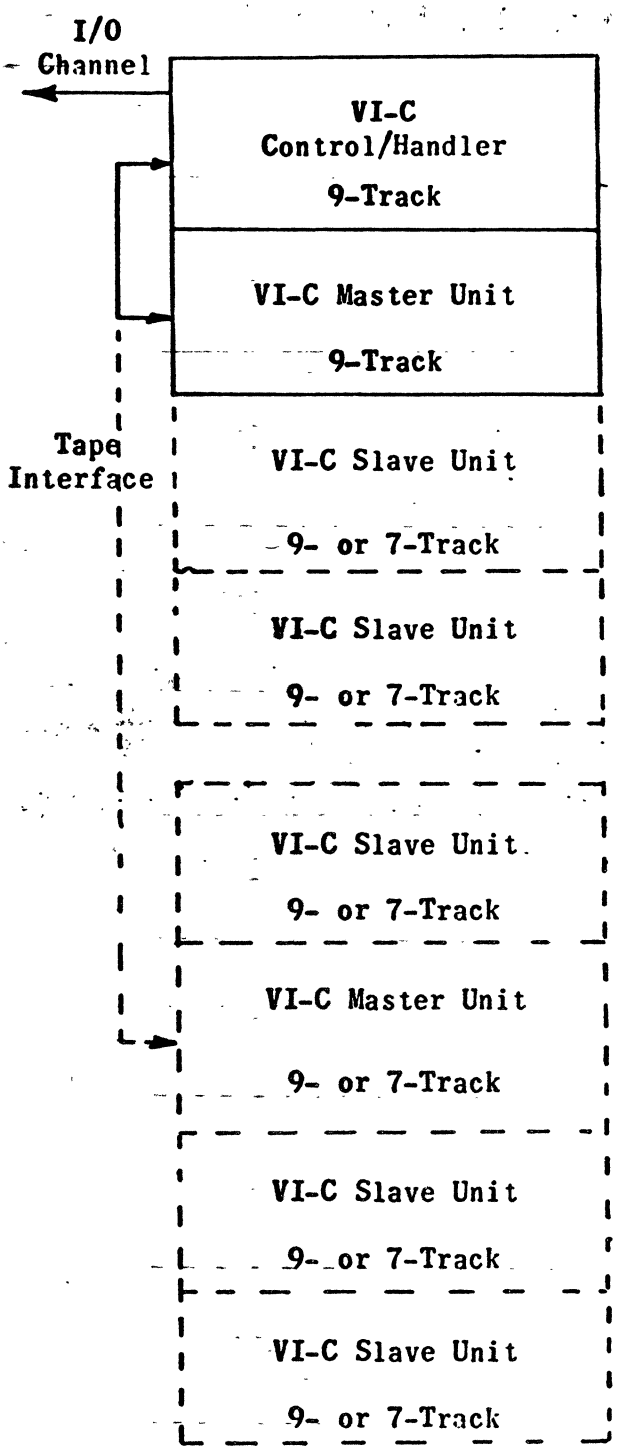
9-Track VI-C Master Unit
Type 0858-10 60-Hz
Type 0858-11 50-Hz

9-Track VI-C Slave Unit
Type 0858-14 60-Hz
Type 0858-15 50-Hz

(Applicable only when the associated Master Unit is 9-Track)

Figure IIB
VI-C SUBSYSTEM CONFIGURATION - 7-TRACK BASIC

Figure 4. Control/Handler 7-Track.



LEGEND: ——— Basic, - - - - Expanded

VI-C Control/Handler, 9-Track
Type 0858-18 60-Hz
Type 0858-19 50-Hz

Control:
- 9-Track NRZI, 800
- One I/O Channel
- Up to 8 tape units

Features:
- 7-Track NRZI-200, 556 or 800 bpi (F0828-00)
- Data Conversion (F0827-00)

Handler:
8-Track Slave Unit

9-Track VI-C Master Unit
Type 0858-10 60-Hz
Type 0858-11 50-Hz

9-Track VI-C Slave Unit
Type 0858-14 60-Hz
Type 0858-15 50-Hz

(Applicable only when the associated Master Unit is 9-Track)

7-Track VI-C Master Unit
Type 0858-00 60-Hz
Type 0858-02 50-Hz

7-Track VI-C Slave Unit
Type 0858-01 60-Hz
Type 0858-03 50-Hz

Figure IIA
VI-C SUBSYSTEM CONFIGURATION - 9-TRACK BASIC

Figure 5. Control/Handler 9-Track.

BIT POSITION	0	1	2	3	4	5	6	7
STATUS BYTE	ATTENTION	STATUS MODIFIER	CONTROL UNIT END	BUSY	CHANNEL END	DEVICE END	UNIT CHECK	UNIT EXCEPTION
BYTE Ø	INVALID FUNCTION	INTERVENTION REQUIRED	OUTPUT BUS CHECK	EQUIPMENT CHECK	DATA CHECK	DATA LATE	WORD COUNT ZERO	DATA CONVERTER CHECK
BYTE 1	NOISE	TAPE UNIT STATUS "A"	TAPE UNIT STATUS "B"	SEVEN TRACK	LOAD POINT	END OF TAPE	FILE PROTECT	"0"
BYTE 2	"0"	"0"	"0"	"0"	"0"	"0"	"1"	"1"
BYTE 3	READ VERTICAL RED. CHECK	LONGITUDINAL REDUNDANCY CHECK	SKEW	CYCLIC REDUNDANCY CHECK	WRITE VERTICAL RED. CHECK	"0"	BACKWARD	"0"
BYTE 4	RUNAWAY	TAPE MOTION FAULT	"0"	"0"	"0"	STALL	TAPE FAULT	"0"
BYTE 0	PROGRAM COUNT Bit 0	PROGRAM COUNT Bit 1	PROGRAM COUNT Bit 2	DENSITY Bit 0	DENSITY Bit 1	EVEN PARITY	DATA CONVERTER ON	FAULT FINDING MODE ON
BYTE 1	WRITE	READ	BACKWARD	SPACE	FILE	REWIND	WRITE TAPEMARK	ERASE
BYTE 2	BACKWARD/ LOADPOINT	EARLY GAP WRITE	TAPE MARK DETECTED	LOW GAIN	EARLY TERMINATE	INHIBIT STATUS IN	CRC Bit 0	CRC Bit 1
BYTE 3	CRC Bit 2	CRC Bit 3	CRC Bit 4	CRC Bit 5	CRC Bit 6	CRC Bit 7	CRC Bit P	LPC Bit 0
BYTE 4	LPC Bit 1	LPC Bit 2	LPC Bit 3	LPC Bit 4	LPC Bit 5	LPC Bit 6	LPC Bit 7	LPC Bit P

Figure 6. Status/Sense/Monitor Sense Bytes.

4091644

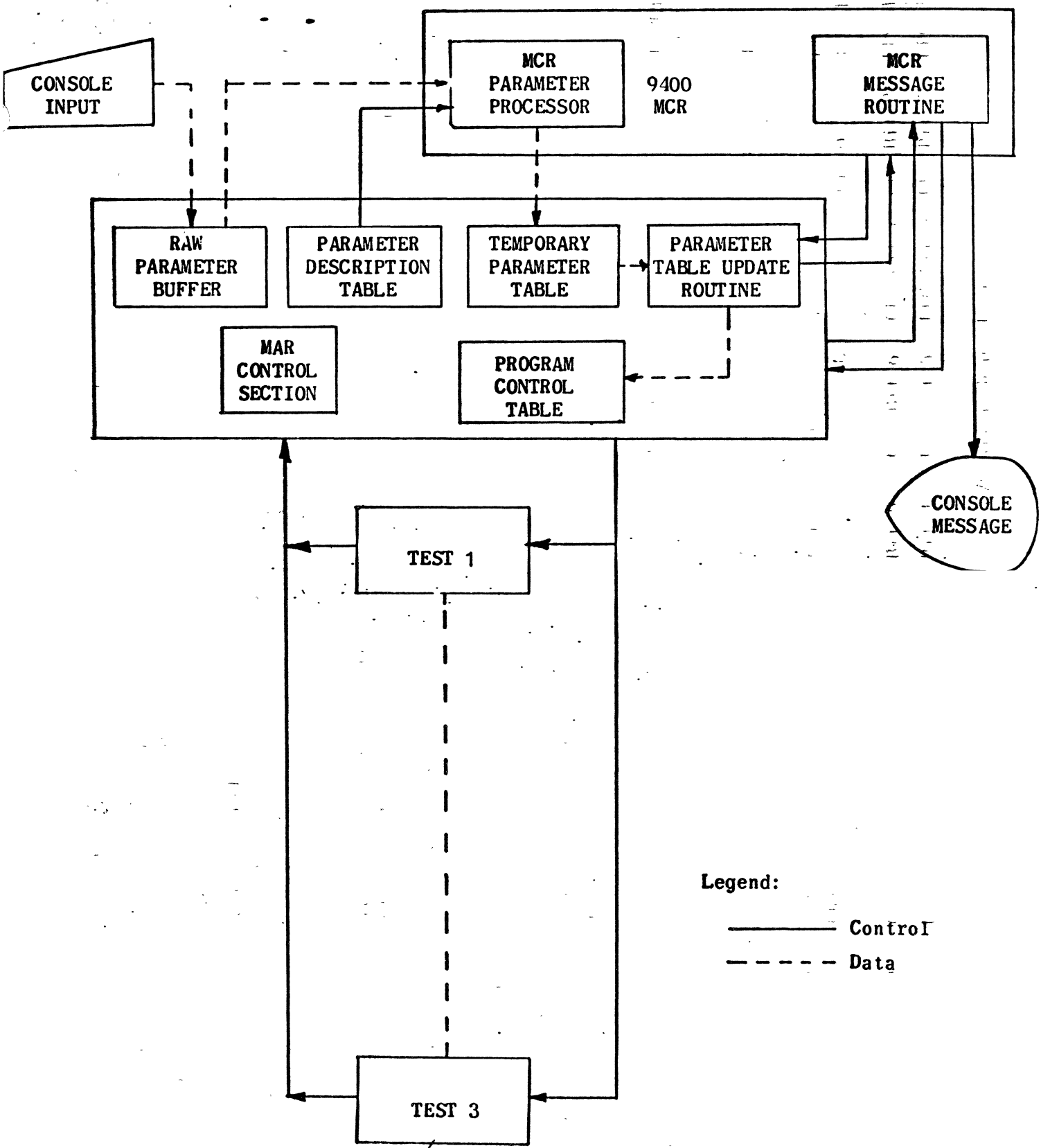


Figure 7. UNISERVO VI-C Test Block Diagram.

Table 1. Test Availabitity Table

TESTBL

Test Status	Assigned Device Table Address
Recovery Count	Initial Command Table Address

Table 2. Servo Availability Table

Device Status	Channel and Device Address	Restart Count

Table 3. Register Allocation

RØ	-	Communication
R1	-	with MCR & PMR
R2	-	First level links
R3	-	Second level links
R4	-	Subroutine Counters
R5	-	General counters
R6	-	Test table pointer
R7	-	Device table pointer
R8	-	Command table pointer
R9-R12	-	General Purpose
R13-15	-	Base registers